

# PATENT ABSTRACTS OF JAPAN

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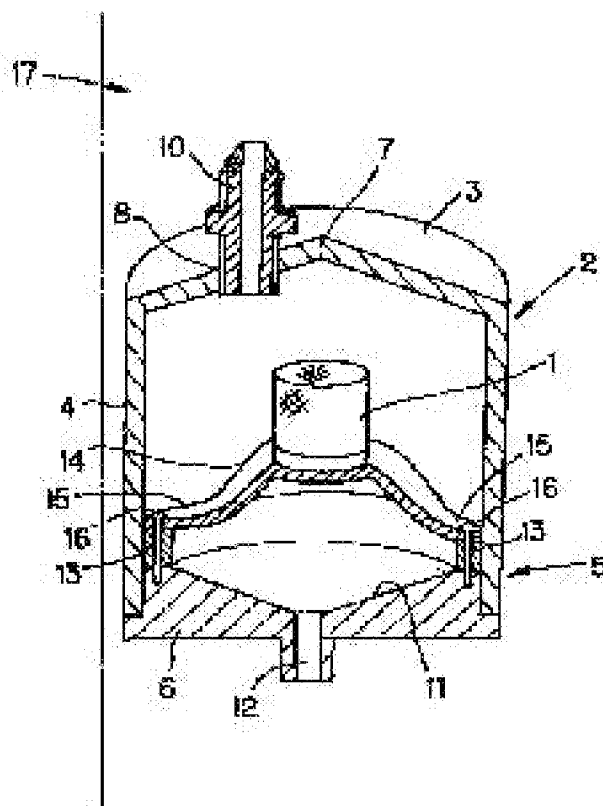
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## (54) EXHAUST GAS SENSOR

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide an exhaust gas sensor which can prevent a change in properties of the exhaust gas sensor, deterioration of sensors, and breakage of the exhaust sensor by preventing the exhaust gas sensor completely from being brought into contact by condensed water in the exhaust gas.

**SOLUTION:** This exhaust gas sensor is provided with a sensor element 1 inside a storage case 2 which is formed with an upper wall 3 whose central part has an external surface inclined upwards and whose exhaust gas introduction pipe 10 is protrudingly-fitted at a position eccentric to its center, and a bottom wall 6 whose central part has an internal surface inclined downwards and a water drain hole 12 is provided at its center. A bracket 14 whose central part inclines upwards is also fitted in the storage case, and the sensor element 1 is also provided at the central part of the bracket.



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**Notes:**

1. Untranslatable words are replaced with asterisks (\*\*\*).
2. Texts in the figures are not translated and shown as it is.

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## FULL CONTENTS

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### [Claim(s)]

[Claim 1] The exhaust air gas sensor characterized by equipping the central part with a sensor element in the accommodation case equipped with the upper wall which has the external surface which inclined up and formed the exhaust gas introduction pipe in the eccentricity central position, and the bottom wall which has the inside which inclined below toward the central part, and established the drain hole in the center position.

[Claim 2] The exhaust air gas sensor according to claim 1 which prepares the bracket with which the central part inclines up in an accommodation case, and equips the center section of this bracket with a sensor element.

[Claim 3] The exhaust air gas sensor according to claim 1 or 2 which fixes a bracket to the circumference of an inside of a bottom wall through a ring-like member.

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### [Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the exhaust air gas sensor which detects and outputs the state of exhaust gas in order to detect change of combustion, such as a large-sized absorption type coldness-and-warmth water machine and a boiler.

[0002]

[Description of the Prior Art] In order to detect the combustion state of these combustion equipment in the boiler which heats bromination lithium in a large-sized absorption type coldness-and-warmth water machine, a calorifier or various boilers, etc., The quantity of remains oxygen in exhaust gas, carbon monoxide, and nitrogen oxide is detected by an exhaust air gas sensor, Or an exhaust air gas sensor detecting the temperature of exhaust gas, and comparing with room temperature etc. using this exhaust gas temperature directly, the operation situation of these combustion equipment is got to know, and the operation of apparatus equipped with this combustion equipment is controlled.

[0003] Although installing this exhaust air gas sensor in the fork road which branched from direct or a flue in such an exhaust air gas sensor in the flue which discharges the gas after combustion, and detecting the state of exhaust gas is performed If an exhaust air gas sensor is installed in such a flue or a fork road, it will be cooled while the moisture produced by combustion is flowing through the flue, and

it will condense, and will become waterdrop. Moreover, when the exhaust air gas sensor has been arranged especially all over the above-mentioned fork road, it is cooled quickly and the exhaust gas in a fork road produces much waterdrop.

[0004] The condensed water which the sulfide contained in exhaust gas melts into water, and this waterdrop serves as dilute sulfuric acid in many cases, therefore was produced from exhaust gas has the very high character which corrodes various kinds of things of an exhaust air gas sensor. Therefore, if this condensed water adheres to an exhaust air gas sensor, the various metal parts of an exhaust air gas sensor will corrode, the output characteristic of an exhaust air gas sensor will change, and it will have a bad influence on operation control of apparatus, and also it damages and will be in the state which cannot be used. In order to make the handling of an exhaust gas sensor easy especially, the interior of the \*\*\*\*\* is carried out more often in one the object for an exhaust air gas sensor operation, or for the exhaust air gas sensor output process, and the parts of such an electronic circuit have the character which is very easy to corrode.

[0005] Moreover, it sets in an oxygen sensor, a carbon monoxide sensor nitrogen oxide sensor, etc. Although the exhaust gas ingredient adsorption portion of the porous sintered body containing the electrolyte which becomes the exhaust gas introduction portion of a sensor from the cover or oxidation zirconia made from ceramics is prepared in many cases, these substances are weak to a temperature change, and if a rapid temperature change arises, they will be damaged in many cases. Moreover, in order that such a sensor may operate in the state of predetermined high temperature, it is in a high temperature state in many cases. Furthermore, when it follows and such an exhaust air gas sensor is used, and forming the heater for heating and the condensed water which exhaust gas was cooled and was condensed adheres [ a certain / it is direct-dropped or ] to a hot exhaust air gas sensor, an exhaust air gas sensor is cooled rapidly and may be damaged.

[0006]

[Problem to be solved by the invention] [ in order to prevent deteriorating or damaging an exhaust air gas sensor with the above condensed water in exhaust gas, covering these electronic parts etc. by synthetic resins, such as silicone resine, is also considered especially for the corrosion control of electronic parts, but ] It has the fault of a manufacture man day increasing electronic parts to a wrap by such a synthetic resin.

[0007] Moreover, [ in order to discharge immediately the condensed water stored in the inside of a sensor, establishing the hole for scuppers in the bottom of a sensor is also considered, but ] Since it was not able to prevent that condensed water adheres to a sensor and the condensed water in a sensor was not able to be discharged smoothly, it was inadequate for the corrosion control of an exhaust air gas sensor, and breakage prevention.

[0008] Therefore, this invention aims at offering change of the characteristic of an exhaust air gas sensor, degradation of a sensor, and the exhaust air gas sensor that can prevent breakage of an exhaust air gas sensor certainly further by preventing certainly that an exhaust air gas sensor contacts with the condensed water in exhaust gas.

[0009]

[Means for solving problem] The upper wall which the central part has the external surface which inclined up, and projected and formed the exhaust gas introduction pipe in the eccentricity central position in order that this invention might solve the above-mentioned technical problem, It has the inside toward which the central part inclined below, and has a sensor element in the accommodation case

equipped with the bottom wall which established the drain hole in the center position, and the bracket with which the central part inclines up is prepared in an accommodation case, and the exhaust air gas sensor which equips the center section of this bracket with a sensor element is constituted.

[0010] [ the exhaust gas which flows through a flue and collides with an accommodation case ] since this invention was constituted as mentioned above When colliding with the external surface toward which the upper wall of the accommodation case inclined, it is shown to parts for a liquid, such as condensed water contained in exhaust gas, to a center position at the external surface which inclined up, they flow, and do not flow into the exhaust gas introduction pipe projected and formed outside.

Moreover, the exhaust gas introduced in an accommodation case is taken in inside from the position which carried out eccentricity from the center within an accommodation case, and without colliding directly to the sensor element fixed to the center position within an accommodation case, after circulating within an accommodation case, the ingredient, temperature, etc. are measured with a sensor element. The condensed water which invaded slightly with the exhaust gas style in the stowage container as a result does not collide with a sensor element directly.

[0011] Moreover, although the condensed water which flowed in the stowage container, or the condensed water produced within the stowage container is dropped at a bottom wall A bracket does not flow into the direction of the sensor element fixed to the central part of a bracket since the central part inclined up, and the condensed water adhering to the bracket which fixes a sensor element at this time etc. flows down to the direction of a bottom wall. Furthermore, it is shown to the inside of a bottom wall to the central part by the inside which inclines below, and the condensed water within the accommodation case which was transmitted and flowed down the inner wall and bracket of an accommodation case etc. is brought together in the drain hole established in the center position of the bottom wall, and is made to flow out of a drain hole out of an accommodation case.

[0012]

[Mode for carrying out the invention] The work example of this invention is explained over Drawings. The accommodation case 2 which stores the sensor element 1 inside becomes the case part 5 which has a upper wall 3 and the cylindrical side wall 4, and a lower part opens, and this case part opened wide from the bottom wall 6 which carries out fitting fixation. The external surface of a upper wall 3 is formed in the shape of [ which makes the central part 7 a vertex ] a cone, and, thereby, the external surface of the upper wall 3 forms a slope where the central part inclined up. Besides, it separates from that central part 7, and it has an opening 8 in the position which carried out eccentricity, and the exhaust gas introduction pipe 10 is screwed in this opening 8, it is fixing to the external surface of a wall 3, and, thereby, the exhaust gas introduction pipe 10 is projected and fixed to the external surface of a upper wall 3.

[0013] The inside 11 of a bottom wall 6 is formed in the shape of [ which makes the central part the peak ] \*\*\*\*, and, thereby, the inside 11 of the bottom wall 6 forms a slope where the central part inclined below. The drain hole 12 is established in this central part. It is in contact with the perimeter of the inside 11 of a bottom wall 6 in the ring 13 made of a synthetic resin, and on this ring 13, a part for the leg 15 of the perimeter end of the bracket 14 which inclines up is laid, and the central part penetrates a ring 13 with a screw 16, and is screwed and fixed to a bottom wall 6. Thereby, it is exchangeable for various kinds of sensors with a bracket by removing this screw 16. The bracket 14 forms the exhaust gas passage by consisting of two or more supports, or forming two or more slits in a \*\*\*\*-like leg.

[0014] The central part is fixing the sensor element 1 to the central part of the bracket 14 which inclines up. As this sensor element, remains oxygen in the conventional exhaust gas, carbon monoxide, the

exhaust gas ingredient detection element that detects nitrogen oxide, or the exhaust-gas-temperature sensor which detects the temperature of exhaust gas is used. Since the exhaust gas introduction pipe 10 is formed in the position which carried out eccentricity from the center of an upper wall 3 as mentioned above to this sensor element 1 being formed in the central part of a bracket 14. Since the exhaust gas introduced from the exhaust gas introduction pipe 10 is guided in the length direction of an exhaust gas introduction pipe and is introduced into a center line and parallel in a stowage container, colliding with the direct sensor element 1 of the exhaust gas from the exhaust gas introduction pipe 10 is lost.

[0015] When using the exhaust air gas sensor 16 which consists of the above-mentioned composition, the exhaust gas passage 17 as the flue which is open for free passage to combustion equipment, or a fork road which branches from that flue carries out installation fixation of this exhaust air gas sensor 16 at the portion arranged at the abbreviation perpendicular. The exhaust gas which flows through the exhaust gas passage 17 by that cause flows without stagnating over the external surface which inclined in the shape of [ of the upper wall 3 of the accommodation case 2 ] \*\*\*\*. When the condensed water which the moisture produced by combustion in combustion equipment in this exhaust gas condensed by cooling, and produced exists, that condensed water etc. flows down over the external surface of an upper wall 3. On the other hand, although a part of exhaust gas flows in the accommodation case 2 from the exhaust gas introduction pipe 10 which projects from an upper wall 3, since the exhaust gas introduction pipe 10 has projected the condensed water which collides with the upper surface of an accommodation case from the upper wall at this time, it does not flow from the exhaust gas introduction pipe 10.

[0016] [ the exhaust gas introduced in the accommodation case 2 ] since the sensor element 15 stored by the inside is being fixed to the center position of the accommodation case 2. It does not collide with this sensor element 15 directly, and is spread in the accommodation case 2, or it flows toward the inside 11 of the bottom wall 6 of the accommodation case 2, and is spread in [ whole ] the accommodation case 2. The exhaust gas contacts the sensor element 1, and Remains oxygen in exhaust gas, carbon monoxide, The state of predetermined exhaust gas is detected by operation of the sensor element which it is chosen if needed [ , such as an exhaust gas ingredient detection element which detects nitrogen oxide, or an exhaust-gas-temperature sensor which detects the temperature of exhaust gas, ], and is installed.

[0017] The condensed water contained in the introduced exhaust gas or the condensed water which it was cooled within the stowage container and condensed dissociates, and the exhaust gas within an accommodation case adheres to the inside of an accommodation case, or a bracket 14. Since the condensed water adhering to a bracket 14 has the central part which fixed the sensor element in the high position of a bracket and is in the upper stream side of an exhaust gas style, it does not flow into the sensor element side and flows down below along with a bracket certainly. Thus, the condensed water within an accommodation case etc. flows down to the inside 11 of the bottom wall 6 of the accommodation case 2, and is discharged out of an accommodation case from the drain hole 12 which the central part was shown at the bottom wall 6 which inclined below, and was established in the central part of the bottom wall.

[0018]

[Effect of the Invention] It is shown to the exhaust gas which flows through a flue and collides with an accommodation case since this invention was constituted as mentioned above to the center position of the upper wall of an accommodation case at the external surface which inclined up, and does not flow and stagnate, and condensed water etc. does not flow into the exhaust gas introduction pipe projected and formed outside. [ moreover, the exhaust gas introduced in an accommodation case ] Since it does

not collide directly to the sensor element which was taken in inside from the position which carried out eccentricity from the center within an accommodation case, and was fixed to the center position within an accommodation case. It is prevented that a sensor deteriorates by the ingredient which a sensor is rapidly cooled with condensed water etc., and is not damaged, and is contained in condensed water etc. [0019] Moreover, although the condensed water which flowed in the stowage container, or the condensed water produced within the stowage container is dropped at a bottom wall. A bracket does not flow into the direction of the sensor element fixed to the central part of a bracket since the central part inclined up, the condensed water adhering to the bracket which fixes a sensor element at this time etc. flows down to the direction of a bottom wall, and the positive thing to prevent can perform that condensed water flows into the sensor element side.

[0020] [ furthermore, the condensed water within the accommodation case which was transmitted and flowed down the inner wall and bracket of an accommodation case etc. ] since it is shown to the inside of a bottom wall to the central part by the inside which inclines below, is brought together in the drain hole established in the center position of the bottom wall and can be made to flow out of a drain hole out of an accommodation case, it is certain that the condensed water in a stowage container etc. adheres to a sensor element -- it is prevented. Therefore, it can prevent certainly that an exhaust air gas sensor contacts with the condensed water in exhaust gas, and it can prevent certainly change of the characteristic of an exhaust air gas sensor, degradation of a sensor, and also breakage of an exhaust air gas sensor.

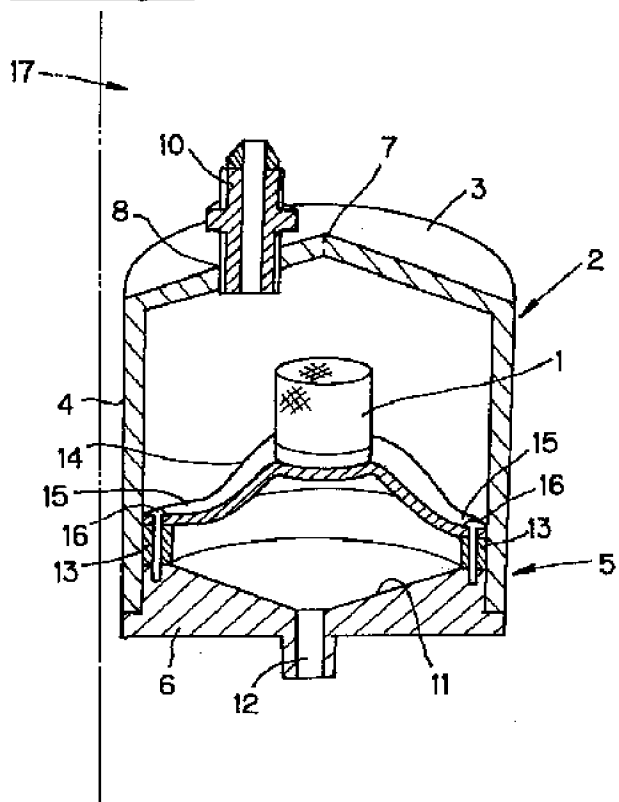
#### [Brief Description of the Drawings]

[Drawing 1] It is the sectional view of an exhaust air gas sensor showing the work example of this invention.

#### [Explanations of letters or numerals]

- 1 Sensor Element
- 2 Accommodation Case
- 3 Upper Wall
- 4 Side Wall
- 5 Case Part
- 6 Bottom Wall
- 7 Central Part
- 8 Opening
- 10 Exhaust Gas Introduction Pipe
- 11 Inside
- 12 Drain Hole
- 13 Ring
- 14 Bracket
- 15 A Part for Leg
- 16 Screw
- 17 Exhaust Gas Passage

[Drawing 1]



[Translation done.]